Proper Wear and Maintenance of Cold Weather Clothing and Equipment

Introduction

- Cold makes tasks more difficult, not impossible
- Prevention of cold injuries is a Command Responsibility
- ALL COLD WEATHER INJURIES ARE PREVENTABLE!!!

Outline

- Susceptibility Factors
- Types of Cold Weather Injuries
- Guidance for Cold Weather Operations
  - Clothing and Equipment
  - Food/Water
  - Personal Hygiene
  - Work Practices
- Conclusion

Is This You?

- Male
- E-4 or below
- Approximately 20 years old
- From a warm climate
- Less than 18 months time in service
- Uses tobacco, alcohol or medications
- Neglects proper foot care

Susceptibility Factors

- Previous cold weather injury
- Inadequate nutrition
- Alcohol, caffeine, nicotine
- Dehydration
- Overactivity/Underactivity
- Long exposure to the cold
- Poor clothing and equip
- Sick or injured
- Acclimatization
- Ethnic/geographic origin
- Wind, cold, rain
- Age
- Discipline
- Physical stamina
- Inadequate training

Types of Cold Weather Injuries

- Hypothermia
- Frostbite
- Chilblains
- Immersion/Trench Foot
- Dehydration
- Constipation
- Sunburn
- Carbon Monoxide Poisoning
- Snow Blindness

Guidance for Cold Weather Operations

- Clothing and Equipment
  - – your 1st line of defense
- Food and Water Requirements
- Personal Hygiene and Field Sanitation
- Work Practices

Clothing Principles

Insulate/Layer/Ventilation

The acronym **CoLD** should be used when dressing for cold weather.

Keep it **C**lean.
Avoid **O**verheating.
Wear it **L**oose and Layered.
Keep it **D**ry.

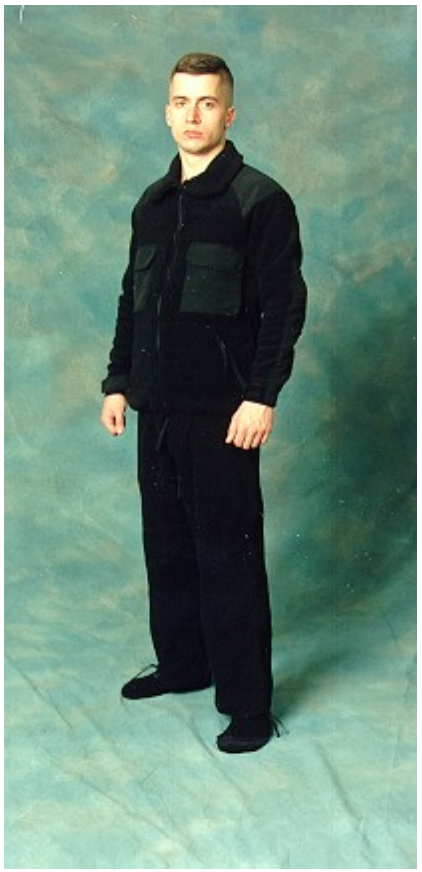
Extended Cold Weather Clothing System (ECWCS)

- Do you wear it well?
  - Polypropylene undershirt/drawers
  - Field liner coat/trousers
  - Gore-tex coat/trousers
  - Cold weather boots
  - Handwear and accessories

ECWCS: Inner Layer

- **Polypropylene Expedition Weight Underwear**
- Primary wicking layer
- Worn directly next to the skin – no underwear!
- Zippered turtleneck for ventilation
- Temp range +40°F to -60°F

ECWCS: Intermediate Layer



Polyester Fleece (Fiberpile) Jacket and Bib Overall (smoking jacket)

Primary insulation layer

High backed bib

Quick release suspenders

Temp range +40°F to -60°F

(not issued at all installations)

ECWCS: Intermediate Layer

- **Cold Weather Coat and Trouser Field Liners**
- Polyester dumbell quilted batting
- Secondary insulation layer for extreme temperatures
- Temp range +40ºF to -60ºF

ECWCS: Outer Layer

- **Gore-tex Jacket and Trousers (parka, extended cold weather camouflage)**
- Provides water repellency and wind resistance
- Armpit zippers for ventilation
- Windbarrier layer around waist
- Temp range +40◦F to -60◦F

ECWCS

- Protects between +40°F to -60°F
- Draws perspiration away from skin and repels water to outer layer for evaporation
- Changes with wearer's needs
- No cotton or wool! (includes BDUs)

Footwear

- Intermediate Cold Wet Boot (ICWB) or Boots, Extreme Cold Weather Type 1
  - waterproof, breathable leather with Gore-Tex liner and Thinsulate thermal insulation
  - designed to keep water out, but can also keep dampness in
  - (Matterhorn/Rockies)
  - 1 pr nylon/cotton/wool socks
  - protects +40°F to -20°F

Footwear

- The Extreme Cold Weather Boot (Vapor Barrier-VB)
  - wear when -20°F or below; protects to -40◦F inactivity and -60◦F activity
  - insulation consists of wool felt [illegible] an outer and inner layer of rubber
  - ensure airvalve is closed
  - trousers bloused over boots
  - 1 pr wool cushion sock

Handwear

- Light-duty leather glove with wool/nylon liner
  - provides inactive person with 30 minutes of protection from frostbite at 0°F
  - not waterproof; temp range +40°F to -20°F

Handwear

- **Mitten inserts and shells (Trigger Finger)**
  - 0ºF or below or if more than 30 minutes of inactive exposure ; temp range +40ºF to -60ºF
  - can use trigger finger w/o inserts while firing with M16
  - do not touch cold metal, POLs with bare hands
- Mitten set, extreme cold weather
  - adjustable strap and buckle
  - wool pile
  - temp range +40ºF to -60ºF

Headwear

- Balaclava
- Pile cap
- Neck gaiter
- Wool scarf
- 70-80% of lost body heat escapes through the head
- When wearing kevlar, wear pile cap or balaclava underneath

Clothing/Equipment Problems

- Malfunctions occur more often during cold-weather
- Moisture from sweat or breathing can become trapped in clothing or sleeping bags
  - minimize overdressing
  - remove clothing layers upon entering heated areas or during strenuous physical activity
  - dry clothing by hanging in the tent

Clothing/Equipment Problems

- Restricted visibility: cold eyeglasses, goggles, and eyepiece sights fog over easily when warm, moist breath passes over them or when coming in from cold to warm areas
- Depth perception is reduced at 0°F and below. Visual acuity is reduced at -20°F and below or windspeed is over 20 mph.
  - compensate by increasing vigilance and slowing down
  - use antifogging compounds on eyeglasses and goggles

Clothing/Equipment Problems

- Loss of manual dexterity from wearing gloves and mittens
  - Lightweight polypro glove liners can be worn
  - Do not blow warm breath into gloves
- Metal can be dangerous to touch (contact frostbite)
- Moisture will condense on cold metal exposed to heat
  - if weapons are brought inside, they should be covered and placed near the floor to minimize condensation
  - clean and dry the weapon after it warms and before returning to cold

Sleeping Equipment

- Modular Sleeping Bag System (M
  - camouflage, water resistant, breathable bivy cover
  - lightweight patrol sleeping bag
  - intermediate cold weather sleeping bag
  - compression stuff sack (to store and carry the system)
  - system provides extreme cold weather protection to -50° F

Sleeping Equipment

- Use sleeping bag on top of insulated sleeping mat
- Layers of tree boughs or mats under the sleeping bag help prevent heat loss to the ground
- Shake out sleeping bag before using to add air to the lining, which improves its insulation
- Air out sleeping bag daily to evaporate moisture

Sleeping Equipment

- In tents, sleep in long underwear and socks with all other clothing hung up to dry
- In improvised shelters, only boots and outermost clothing layer should be removed. Place clothing under the sleeping bag where it can add insulation without accumulating moisture from the body.
- Wear a balaclava while sleeping to protect the ears, neck, and face
- DO NOT put head inside sleeping bag since moisture from the breath can accumulate
- Arctic mittens can be worn on the feet while inside the sleeping bag
- No sleeping in running vehicles

Load-Carrying Equipment

- Small external pockets
  - use for small, high energy foods to be eaten on the move
- Large external pockets
  - use for rations for morning and evening meals, extra socks, scarf, spare cap
- External attachment points
  - attach sleeping mat to the bottom or under the top flap
- Main compartment
  - pack sleeping bag at bottom, use upper half for spare clothes, where they can be easily reached

Special Considerations for Tents, Heating, Ventilation

- **Precautions associated with use of stoves/heaters**
  - **Train soldiers to set up, light, refuel, and maintain**
  - **Fireguards posted when in use**
  - **Keep stove pipe clean**
  - **Ensure ventilation within the tent**
  - **Remove snow from ground before tents set up**
  - **No unvented kerosene heaters in sleeping tents**
  - **Provide carbon monoxide training**

Water Consumption

- 5-6 quarts of water/day
- Avoid caffeine, nicotine, and alcohol
- Hot juice or soup
- Protect water from freezing
- In emergency, melt snow and purify before drinking
- Dark, yellow urine is first sign of dehydration

Water Consumption

- Plastic canteen, when filled with water, will freeze quickly
  - carry canteen in interior uniform pocket or wrapped in clothing and placed in pack
- Do not fill canteen over 2/3 full to allow for expansion should ice form
- Insulated canteen, 1 quart

Food Consumption

- Caloric intake increases 25-50%
- Calories needed
  - moderate exertion - 4500 calories
  - extreme exertion - 8000 calories
- 4 standard MREs per day
  - 3 MREs = 3600 calories
- Plan for hot chow, warm beverages or heat MRE

Food Consumption

- Frequently snack throughout the day
- Carry emergency rations
- Eat large snack at night to keep warmer during sleep and prevent shivering

Personal Hygiene

- Change socks 2-3 times daily
- Brush teeth daily
- Change underwear at least twice weekly
- Keep clothes clean
- Wash hands, feet, face, groin daily (canteen baths or handy wipes)
- Shave at evening if possible

Individual Cold Weather Survival Kit

- Waterproof matches and fire starters (candles)
- Signaling devices (mirror, whistle)
- Knife
- Pressure bandage, lip balm, sunglasses
- Water container (metal for use in fire)
- Compass
- Emergency rations (MREs, trail mix)
- Foil survival blanket
- 5 m of strong nylon cord
- Small flashlight

Work Practices

- Proper cold weather training for acclimatization
- Practice performing duties while wearing cold weather clothing
- Ensure cold weather clothing is in proper working condition
- Feet, hands, exposed skin mu
- Maintain proper hydration, n
- Minimize periods of inactivity

Work Practices

- Command emphasis on education and training
- Appropriate use of weather data, especially the wind-chill factor
- Liberal use of sick call
- Provide time and locations for thorough warming and clothing changes
- Use Field Sanitation Teams and buddy checks to prevent cold injuries

Conclusion

- Dress properly
- Drink plenty of fluids
- Eat right
- Keep in shape
- Get plenty of rest
- Minimize periods of inactivity in cold
- Maintain a positive attitude

Reference Materials

- Technical Note No. 92-2 *Sustaining Health and Performance in the Cold: Environmental Medicine Guidance for Cold-Weather Operations*
- TC 21-3 *Soldier's Handbook for Individual Operations and Survival in Cold-Weather Areas*
- FM 31-70 *Basic Cold Weather Manual*
- FM 21-10 *Field Hygiene and Sanitation*
- FM 21-11 *First Aid for Soldiers*
- FD Pam 40-5 *Win in the Heat and Cold: Climatic Injury Prevention Guide*

QUESTIONS?

LEADER'S GUIDE

TO PREVENTION OF COLD INJURIES DUE TO EXPOSURE TO TEMPERATURES BELOW 50°F

INFORMATION ON THIS CARD IS PROVIDED TO ASSIST LEADERS IN RISK DECISION MAKING AND CONTROL DEVELOPMENT AS PART OF THE RISK MANAGEMENT PROCESS. RISK DECISIONS AND CONTROLS SHOULD BE DEVELOPED FOR ALL TRAINING. LEADERS MUST ENSURE THAT THESE RISK DECISIONS/CONTROLS ARE IMPLEMENTED INTO UNIT TRAINING PLANS AND THAT TRAINING IS SUPERVISED.

RECOMMENDATIONS

WIND CHILL CATEGORY (SEE REVERSE)	MINIMUM UNIFORM: FIELD UNIFORM	MINIMUM UNIFORM: PT UNIFORM	MINIMUM UNIFORM: OFF DUTY ACTIVITIES	OTHER FACTORS
LITTLE DANGER	POLY PRO (T& B) ECWCS** (T&B) BALACLAVA TRIGGER FINGER MITTENS GORE-TEX BOOTS*	PFU SWEATS BLACK KNIT CAP BLACK GLOVES W/INSERTS	COAT HAT EAR PROTECTION GLOVES BOOTS	-- INCREASE LEADER SURVEILLANCE --. NO FACIAL CAMOUFLAGE -- INCREASE HYDRATION. -- PROVIDE WARM-UP AREAS WITH HOT DRINKS, ETC. -- SKIN COVERED AND DRY
INCREASING DANGER	POLY PRO (T& B) COAT &TROUSER LINERS ECWCS** (T&B) BALACLAVA/PILECAP ECW MITTENS BOOTS ECW (TYPE I)	PFU SWEATS POLY PRO (T&B) BALACLAVA TRIGGER FINGER MITTENS	COAT HAT EAR PROTECTION GLOVES BOOTS	-- RESTRICT NON-ESSENTIAL OUTDOOR TRAINING. -- LOW ACTIVITY: 30-40 MIN WORK CYCLE. -- SEDENTARY ACTIVITY: 15-20 MIN WORK CYCLE. -- USE BUDDY SYSTEM. -- NO EXPOSED SKIN
GREAT DANGER	POLY PRO (T& B) SHIRT, COLD WX TROUSER LINER ECWCS** (T&B) BALACLAVA/PILECAP ECW MITTENS BOOTS ECW (TYPEII)	PFU SWEATS POLY PRO (T&B) BALACLAVA TRIGGER FINGER MITTENS	HEAVY COAT LONG UNDERWEAR HAT & SCARF MITTENS CW BOOTS	-- CONSIDER INDOOR TNG. -- HIGH INTENSITY ACTIVITY: <15 MIN WORK CYCLE. -- CONSIDER CANCELING LOW OR SEDENTARY ACTIVITY OUTDOOR TNG -- COVER ALL EXPOSED SKIN

* GORE-TEX BOOTS = Matterhorn/Rocky Mountain/or similar GORE-TEX insulated leather boots
** ECWCS = Extended Cold Weather Clothing System (GORE-TEX)

Office of Safety Management - Leading The Way In Force Protection

WIND CHILL TEMPERATURE

Wind Speed (mph) ↓	Air Temperature (°F)																	
	40	**35**	**30**	**25**	**20**	**15**	**10**	**5**	**0**	**-5**	**-10**	**-15**	**-20**	**-25**	**-30**	**-35**	**-40**	**-45**
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95

Wind speed based on measures at 33 feet height. If wind speed measured at ground level multiply by 1.5 to obtain wind speed at 33 feet and then utilize chart.

RISK OF FROSTBITE

GREEN – LITTLE DANGER (frostbite occurs in >2 hours in dry, exposed skin)
YELLOW – INCREASED DANGER (frostbite could occur in 45 minutes or less in dry, exposed skin)
RED – GREAT DANGER (frostbite could occur in 5 minutes or less in dry, exposed skin)

WET SKIN COULD SIGNIFICANTLY DECREASE THE TIME FOR FROSTBITE TO OCCUR